

### How can solar energy be used?

- Solar energy can be used to heat water or to make electricity.
- Water is pumped through solar heating panels where it receives energy from the sun.
- Solar photovoltaic (PV) panels convert light into electrical energy.
- Solar panels only work during the day.







#### **STEM Learning Objectives**

- Science: Light (extend your experience of light looking at a range of phenomena) and Earth and space (find out the way that ideas about the solar system have developed).
- Technology design purposeful, functional, appealing products.
- Engineering design, make, test and improve a product.
- Maths draw 2D shapes; know that diameter is twice the radius.





Don't cut yourself or burn your fingers. Use cool melt glue guns to avoid serious burns. Don't spike yourself with the compasses. Don't look directly at the sun as you could damage your eyes.

# Collect your materials

You will need:

- A solar energy kit (from the electric boat completed in module 3)
- A polystyrene foam base (completed in module 2)
- Offcuts of polystyrene foam
- Several card discs
- A motor pulley
- Pompoms



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## Assemble your tools

You will need:

- A ruler
- A sheet of card
- Coloured felt tip pens
- A pair of scissors
- A pair of compasses
- A cool melt glue gun







The polystyrene foam sheet is very buoyant (i.e. it floats well) and does not absorb water.

It is also easy to cut with scissors and join the parts together with the glue gun. Gravity pulls the boat down.

Upthrust (provided by the water) pushes the boat up.

If the force pulling it down is bigger than the force pushing it up it will sink.

The friction acting between the boat and the water slows it down. This is water resistance or 'drag'.

The fan pushes the air backwards; the opposing force of the air on the fan pushes the boat forwards.

#### Mount the solar panel and motor

- 1. Carefully peel the solar panel and the motor stand off the boat.
- 2. Place the solar panel on its stand.
- 3. Glue the motor stand back to the other end with the motor on the side furthest away from the solar panel.







The radius is half the diameter.

This experiment was invented by James Clerk Maxwell in the 1850s as part of his research into colour vision and how different people see mixtures of colours.



In the 1670s, Isaac Newton proved that sunlight could be divided into primary colours.

He concluded that mixing primary colours together could produce white light.



There are lots of limitations of this model! For example:

The relative sizes of planets are not representative

The relative spacing is not representative

The planets should travel on different orbits

The Earth should rotate about its own axis to create day and night



You should see different colours, particularly when the disc is rotating slowly.

The reasons for the optical illusion are not understood but may relate to the behavior of colour receptors in the eye.

This could prove useful for diagnosing eye diseases.



The first model represents Saturn's and its rings.

The rings appear solid but are thought to consist of lots of separate particles of dusty ice.

The particles appear to form solid rings because there are so many of them and the sun reflecting off the ice makes them look bright.

The second model represents rockets orbiting the Earth.



Solar energy can be used to heat up water or produce electricity.

When light falls on a solar PV panel it produces electricity.

In the geocentric model of the solar system the Earth is at the centre.

In the heliocentric model of the solar system the sun is at the centre.

The sun is considered to be at the centre nowadays.

A rainbow is formed when sunlight is split into its component colours by raindrops. Light energy from the sun is converted by the solar panel to electricity; this is then converted to kinetic (movement) energy as the motor rotates.